OCTOBER 1945

# SOIL CONSERVATION

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# SOIL CONSERVATION

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*Front Cover: Little Miss Georgia Millender, daughter of District Conservationist Alfred F. Millender, examines an ear of hybrid corn produced in a contour cultivated field on farm of George Van Syckle, a district cooperator in Harrison County, W. Va. Photographer: Ann Ware.*

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# *Cartography at War...* By Louis A. Woodward

*THE* Cartographic Division of the Soil Conservation Service was a key link in the chain which produced the maps and charts required by the armed forces for prosecution of the war. It occupied this position primarily because of its experience in producing similar materials for the Soil Conservation Service for more than 10 years.

Some of the major items were topographic maps, planimetric maps, aeronautical charts, photo-maps, aerial photographs, intelligence photographs, radar charts, bomb target charts, instrument trainer charts, fire plan charts, landing charts, nautical charts, long range navigation ("loran") charts, and various other materials. Some of the work performed still has a high security classification and can not be described at this time. The following are some of the more than 15 War and Navy organizations for whom work was performed:

*War Department:*

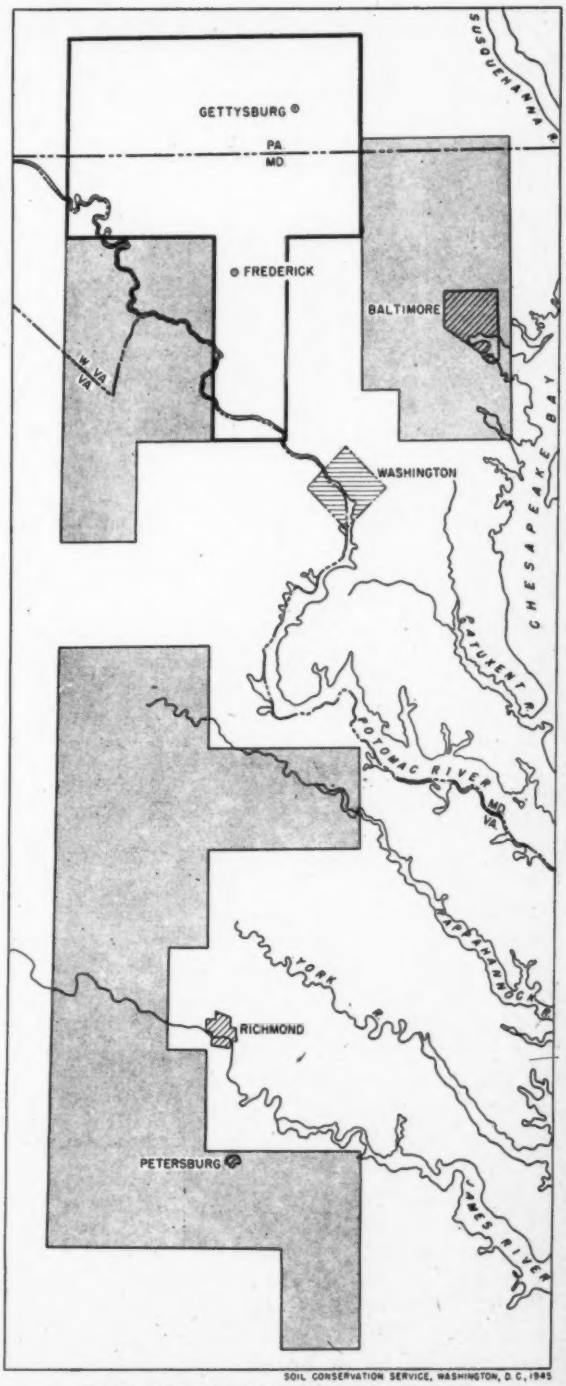
Corps of Engineers
Army Map Service
Army Air Forces, Aeronautical Chart Service
Army Air Forces, Film Library

*Navy Department:*

Hydrographic Office
Visual Design Research Laboratory
Bureau of Aeronautics
Bureau of Yards and Docks

In the years preceding World War II, American military experts carefully developed their plans for M-Day, a hypothetical date on which the production facilities of this country might be mobilized for national defense, according to preconceived plan. Actually M-Day for our Cartographic Division was in September 1941, about three months before Pearl Harbor. On this date a request was made by the Corps of Engineers of the War Department to produce 109 topographic maps at a scale of 1:20,000 with a 20-foot contour interval of an area in Virginia, Maryland, Pennsylvania, and West Virginia. (See Corps of Engineers map.)

This work was part of the National Defense Program and covered one of the areas considered as a likely spot of invasion. It is difficult today to



TOPOGRAPHIC MAPS FOR THE CORPS OF ENGINEERS

NOTE.—The author is cartographic engineer, Soil Conservation Service, Beltsville, Md.

look back and justify our invasion fears of 1941. However, at that time an invasion was considered a real possibility, and the area assigned to the Soil Conservation Service for producing topographic maps was, according to military experts, a part of one of the places on the East Coast most suitable for an invasion. The area between that assigned to the Soil Conservation Service and the coast was assigned to two other federal mapping organizations.

The specifications required the use of new aerial photographs, and therefore, one of the first steps was to make an aerial survey of the entire area. Since the majority of our peacetime mapping work involved the production of planimetric maps, only a relatively few pieces of stereo-photogrammetric equipment capable of plotting topography had been procured. On a topographic mapping project, the area compiled per man day with stereo-photogrammetric equipment is only a fraction of the area that can be mapped by planimetry alone during the same time. Equipment limitations made it necessary to devise new methods in order to comply with delivery requirements, as new equipment was not available in less than 2½ years. The method developed was one which utilized existing stereo-photogrammetric equipment and field surveying methods. The magnitude of this project is indicated by the approximately 6,200 lineal miles of level lines, together with approximately 1,000 miles of traverse. The 6,200 miles of level lines is almost equal to the distance from Washington, D. C., to Tokyo, Japan, and the 1,000 miles of traverse lines approximate the distance from Washington to Omaha. Specifications issued by the Corps of Engineers, in general, stated that 90 percent of all clearly identifiable features should be located on the map within 1/50-inch of their true geographic position, and that 90 percent of all contours should be within one-half of the contour interval. In order to meet these requirements with the equipment available, approximately 1,250 control points were identified and located by surveys and approximately 950,000 spot elevations determined. The manuscript maps were compiled at a scale of 1:12,000, color separation drawings made at 1:20,000, and the final maps reproduced at a scale of 1:31,680. At a later date the reproduction of the maps compiled by the Forest Service (shown by heavy outline on the Corps of Engineers Map) was assigned to the Soil Conservation Service. Reproduction was required in four colors, i.e., culture in black, drainage in blue, woodland in green, and topography in brown. *A total of 520,000 printed maps was delivered to the War Department and as each map was in four colors, a total of 2,080,000 impressions was made. Approximately 30 tons of paper were used in printing the maps on this project.*

In May of 1942 the topographic mapping program was getting well under way when a request was received from the Army Map Service to produce maps of several camp and maneuver areas. By this time Selective Service was inducting thousands of men each month and camps were being constructed in which to quarter and train these men. Maps of these areas were required immediately. The urgency of this work necessitated the use of all available personnel and equipment. With the assistance of the Regional Cartographic Divisions planimetric maps showing all cultural and drainage features, at scales ranging from 1:62,500 to 1:125,000, were produced of approximately 13,000 square miles in 60 days. In some cases topography was required to be taken from an old topographic map, and adjusted to the new planimetric map. Most of this project was produced by working on a three-shift basis with each shift working some overtime.

Long before the topographic mapping program was completed for the Corps of Engineers, the Aeronautical Chart Service of the Army Air Forces requested the Cartographic Division to compile 140 aeronautical charts covering about one-third of the United States. (See Army Air Forces map.) These charts were for defense and training. The size of this program, considering the commitments already made to the Corps of Engineers for topographic mapping, was far beyond the available facilities in Washington, and, therefore, assistance was requested from the Regional Cartographic Divisions. A substantial portion of this program was completed in regional offices. In addition to compiling the charts, this program called for the delivery of color separation reproduction negatives. The method used on this program was to compile and draft all of the required information on one or occasionally two boards where the information to be shown was very complex, in order to avoid registration difficulties. The required number of copy negatives were made of each board, and color separation was effected by lithography.

By this time the defensive stage of the war was rapidly drawing to a close and plans were under way to take the initiative. This, of course, required various types of maps and charts of foreign areas. The United States first took offensive action in North Africa and, as might be expected, this was the first theater of war in which we com-

TOPOGRAPHIC MAPS FOR THE ARMY MAP SERVICE

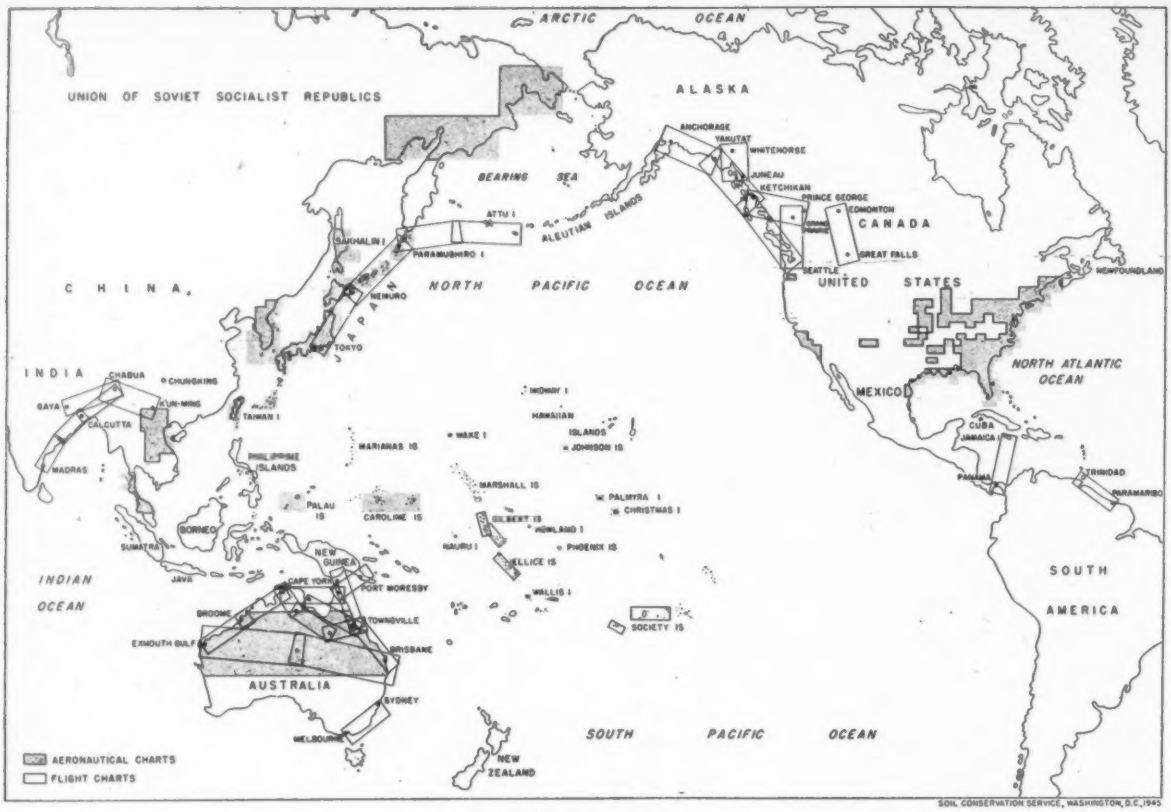
piled and reproduced maps. Naturally, our work was completed long before ground operations started. Although we did not have any one large specific project in North Africa, a great many miscellaneous maps, bomb target charts, etc., were produced in this area. *Another type of early offensive operation on which our facilities were utilized, was in preparing some of the material used to plan and execute various commando raids. As an example we produced some of the material used on the famous Dieppe raid.* When the materials were being produced we did not know exactly what they would be used for, or when they would be used; however, the personnel who produced these materials were not greatly surprised to read of the commando raid in the newspapers at a later date. Only the personnel who actually produced the materials had knowledge of the area covered by the maps.

One of the most interesting and also one of the most difficult projects was the preparation of topographic maps covering approximately 34,000 square miles in Northern Italy for the Army Map Service. (See Army Map Service Map.) These maps were at a scale of 1:50,000 with a 50-foot contour interval. Again the Regional Cartographic Divisions played a very important part. This program was handled largely on an assembly-line basis with a portion of the work first being performed in Washington where the necessary large equipment was available, forwarded to the regions for drafting, and then returned to Washington for final editing and preparation of reproduction negatives. Numerous difficulties were encountered on this project in meeting the required delivery schedule. Available Italian maps, aerial photographs, and other intelligence information were used in producing these maps. Quite frequently aerial photographs of various areas in Italy would be received within a very few days after the photographs were made. On more than one occasion, personnel were detailed to Washington from the regions in order to assure compliance with War Department delivery requirements. Assistance was also obtained from the U. S. Forest Service and the Bureau of Agricultural Economics.

On the Italian project the Army Map Service requested the delivery of photographic color proofs on all completed sheets. A reasonably satisfactory method of preparing color photographic proofs by "projection" was in use by the Army Map Service at that time; however, the contrast between the various colors by the method then in use was far from satisfactory. The use of color proofs when colors are not clear and distinct increases editing time and also increases the possibility of errors in the final maps. Errors in maps can cause the loss of many lives and mean success or failure of a military venture. *A "contact" color photographic method of proving maps before reproduction was developed by the Division that is superior to all other known methods of color photographic proving. This method is in general use today.*

As the work in Italy was about completed, another assignment was made by the Army Map Service which included the preparation of topographic maps covering portions of the Islands of Java and Madura. These maps were probably the most complicated of all. Eleven colors were required to show adequately all of the required information. Again a portion of the work was assigned to the Regional Offices and the U. S. Forest Service.

With completion of the Java-Madura project our work for the Army Map Service was finished. By agreement between Aeronautical Chart Service and Army Map Service, the facilities of the Soil Conservation Service available to the War Department were to be utilized entirely by the Army Air Forces. Our first assignment was to prepare charts covering various groups of Islands in the West and Southwest Pacific. (See Army Air Forces map.) This was closely followed by an assignment to compile aeronautical charts of all of the Japanese Islands from below Formosa north through Sakhalin Island. *It is interesting to remember the argument between many of the per-*




CHARTS FOR THE ARMY AIR FORCES

*sonnel to see who would get to work on the Tokyo sheet. Before this sheet was completed, a substantial portion of the employees of the Cartographic Division had something to do with it. Some of the photographs taken on the Doolittle raid, together with others taken at a later date, were used in preparing these charts.*

After the Japenese charts were completed, various assignments were received which included areas in Korea, China, French-Indo-China, and Malaya.

Two types of charts were prepared for the Army Air Forces, one generally known as "aeronautical charts," and the other "flight charts." The aeronautical charts are generally at a scale of 1:250,000, 1:500,000, or 1:1,000,000 and cover most of the world. The flight charts are generally used for flights between large bases and are at a scale of 1:1,000,000. Several of the aeronautical and flight charts have been compiled many times, as better source material became available. The total area covered by aeronautical and flight charts, including water areas and recompilations due to new information being secured, was in excess of 11,000,000 square miles.

There have been a great many relatively small jobs completed which are not included in the major projects listed above. These jobs ranged in cost from a few hundred dollars up to 20 to 25 thousand dollars each. Many of these jobs were more difficult than the larger ones mentioned above where definite delivery schedules were established. Some were of an experimental or development nature while others were purely emergency work and required a continuous 24 hour day, 7-day week effort until completed. *On one particularly rush job we had overnight air messenger service between Washington and London.*

One of our development projects was to produce a chart which would have the same features appearing in the same form as the electronic image on a radar scope. This involved considerable research, including flights in a B-24 bomber to observe the radar scope in flight operation, etc. A combination of our development, together with the ideas of the 8th and 20th Air Forces, was finally adopted. This type of chart is entirely different from the usual maps and charts as many of the ground features do not appear on the radar

(*Continued on page* 82)

# Grassland Farming in Vermont

By L. Stanford Altpeter

Grassland farming proves successful in Vermont.

*SHORTLY* after the White River Soil Conservation District was established, the board of supervisors and the planning staff began to realize that some particularly knotty problems would have to be solved on many farms if erosion were to be halted. Croplands on our farms can be a nightmare to the soil conservationist trying to plan row crops. He must deal with variable soil types, extreme and uneven gradients, seepage areas, ledges, boulders.

On the Montpelier soil group, for example, ledges outcrop on a north-south line at approximately a 45-degree angle, with uneven pockets of soil between outcrops. North-South plowing and cultivation is imperative on such lands, regardless of the degree or direction of slope. Montpelier soils are found across the entire northern third of the district.

In other areas district land is of an undulating nature, due to erosional and glacial processes over the ages. Hard pans scattered unevenly force ground water to the surface in hit or miss fashion. Soil type changes occur so frequently that soil maps are unlikely to present the soil condition in sufficient detail.

The most satisfactory solution to these problems seemed to be for farmers to turn to grassland farming. There was need, however, to inquire into local experience to provide moral support for such a program.

One of the early requests for assistance received by the district came from Joseph and Claude Bellefeuille of Tunbridge, Vt. Father and son had developed a herd with an excellent record for production. Production was on the increase. In 1940 they had attained a herd average of about 375 pounds of butterfat per cow. In 1941 this average jumped to 417 pounds of butterfat—significant in view of the fact that a large part of the herd was made up of first and second calf heifers.

Timothy was held back by the damp, cold spring, but tall oatgrass kept right on growing on the Joseph Paquette farm, Bethel, Vt.

The Bellefeuilles for nearly twenty years had been on a strictly grass land program. "Wouldn't be bothered with corn silage," they said.

Another early cooperator was Clifton Chadwick of Randolph Center, also a devotee of grassland. With approximately 15½ acres of meadowland, Chadwick had been wintering 19 head of stock, including 11 high grade milkers, one bull, one horse and five young cattle. In addition he ranged on the meadow a flock of 1,000 laying hens. A half acre of meadow was planted to corn each year for poultry shade.

Down on the bottomland at South Randolph, Guy Young was doing wonders with hay production. On approximately 17 acres he produced enough hay to winter an excellent herd of 20

Note.—The author is district conservationist, Soil Conservation Service, Randolph, Vt.

Jersey milkers, a bull, a dozen young animals and a team of horses. Young hadn't turned a furrow in 16 years! He had, of course, fertilized heavily—about 18 loads of manure on every acre every year, all backed up by phosphate. Young got lots of hay, fully as high milk production as when he had grown corn, and the cost of his milk was lower.

Even a casual examination of weather and soil conditions revealed the reason for the success of these three farmers. An annual rainfall of 40 inches with excellent summer distribution, a cool, clear climate due to neighboring mountain ranges, and limestone soils, all spelled first-rate growing conditions for grasses and legumes.

These and other examples of success with grassland farming added up to a fairly imposing record. In the three instances cited, and in most others, no silage of any sort was used. Fact of greatest interest was not that a few farmers had been found who didn't bother to raise corn, but rather that these farmers were outstanding dairymen and community leaders. They were sound operators financially. Bellefeuille and Chadwick are leading each of the two local dairy improvement associations in total butterfat production.

The whole subject of grassland farming in the dairy section is both fascinating and complicated. Greatest barrier to the adoption of this type of farming on the rough farms in the area proved to be the fear of the effect of drought on hay production. Many farmers believed that growing corn silage provided greater assurance of adequate winter roughage than an all-grass program.

The district staff, however, leaned to the opinion that the greatest hazards to hay crops are low fertility and poor choice of species—not drought. Fertility levels were low as a result of erosional losses and of failure to replace plant foods removed in crop form. The average farmer believed the old adage that a wise man lets someone else do the experimenting.

Arrangements were made in 1941 with the Vermont Agricultural Experiment Station and the regional SCS nursery division to establish three series of grass and legume plots, one of which was carefully located on shallow, ledgy soil on a southerly slope. Careful observation of these plots taught the district staff much about the adaptation of species to site.

While these plots were being watched, members of the district staff lost no opportunity to help a cooperator in the management of hay or pasture lands. Outstanding results were publicized. The comparative fertility requirements of all crops produced locally, including various hay mixtures, was stressed in farm visits. No aspect of hay or pasture management was overlooked.

By 1943, the staff felt that it had acquired enough information to prove that heavy crops of hay could be raised during dry years. Sizeable meadows on some of the coarsest, poorest soil in the district (outwash terrace soil from acid materials), were seeded to various combinations of tall oat grass, northern brome, orchard grass, alfalfa, ladino clover and—as a safety factor—alsike and red clover. Emphasis was placed on deep-rooted plants in order to overcome low surface moisture, high surface temperatures and leaching losses. Careful seeding, fertilizing and harvesting schedules were worked out. All work was carried out by farm owners and all materials except small amounts of special seed were purchased by them.

Minimum lime recommendations were one ton per acre plowed under, and another ton harrowed into the surface. Six to eight loads of manure reinforced with phosphate, 30 to 40 pounds of boron, and not less than 40 pounds of available potash in commercial form were also harrowed into the surface before seeding. Seeding was done with a hand seeder and the area immediately cultipacked.

The greatest stress was placed upon early seeding (not later than May 1), regular annual fertilizer applications and early harvesting. The best results occurred when fertilizer was applied about the first week in October. The standard top dressing is the same as at time of seeding, but without boron or lime. The soil is checked periodically for lime needs and the plants for indications of other deficiencies.

**The type of outwash terrace soil on which the mixture of tall oat and other grasses did so well. The clump of tall oatgrass placed in the foreground for picture purposes became established and finally matured without further attention.**

**Partially matured stand of tall oatgrass, orchard grass, brome grass, ladino clover, red clover and alfalfa. Joseph Paquette farm.**

This treatment of haylands may appear to be excessively fussy for an ordinary farmer, yet it is this attention to the needs of good hay that has brought home to cooperators in this district a better appreciation of the possibilities of grassland farming.

The experience of Eli and Joseph Paquette of Bethel, another congenial father and son team, illustrates this point. These operators picked a 2½ acre chunk of outwash terrace that had been "corned to death" because they and their predecessors couldn't raise hay on it.

The mixture used was decided partly by availability of seed and partly out of the desire to make comparative observations. It consisted of 4 pounds of tall oat grass, 4 pounds of orchard grass, 2 pounds of brome grass, 5 pounds of alfalfa, one pound of ladino clover and 3 pounds of red clover per acre. The results have been so outstanding and so uniform (1944 was one of the dryest summers on record in Vermont) that this stand has received widespread attention. The tall oat grass has been outstanding, although it is felt that the presence of orchard grass and brome grass tends to provide the support that gives this stand such a striking appearance. The associated plants mature uniformly.

Although there are many acres of ladino and timothy on the heavier soils of this farm, the Paquettes state that their herd of Holsteins not only shows decided preference for the hay grown on this poor piece of land, but jump about 10 percent in production when fed on it. The stand has now been cut for three years and has shown no sign of deterioration. As expected, alfalfa is not so heavy as might be wished, but it is felt that continued attention to lime and fertilizer will be reflected by a better alfalfa stand at the next seeding. Although the annual cut has not been weighed, the owners estimate the 1944 yield at 4 tons. It has been fully as great in 1945.

The Paquettes are not only unconcerned about "fussiness" in hay management, but have recently announced that when the war is over they plan to drop their canning corn and grow hay alone on their cropland. The Paquettes heretofore took great pride in their corn. This pride has now been shifted to hay. They have thriftily used waste cobs and husks from the canning factory, plus stover, for silage. They plan to use grass silage in the future. This course of action was not suggested by the farm planner. The decision has been reached by the Paquettes, themselves, through observation of the results which they obtained through more careful management of hay on their farm.

What would one expect such a program to contribute on established grass'and farms with high production records such as that of the Bellefeuille's mentioned above? On this farm the roughage improvement program coincided with the maturing of a really outstanding breeding program. Joseph Bellefeuille who handles the feeding of the herd feels that improved roughage has contributed

heavily toward the following, startling HIR butterfat production record.

| | | | |
|---|---|---|---|
| 1940 | 375 lbs. | 1943 | 532 lbs. |
| 1941 | 417 lbs. | 1944 | 611 lbs. |
| 1942 | 468 lbs. | | |

The Bellefeuille herd, in 1944, attained an average milk production per cow of 11,095 pounds. This is the highest 2X average ever recorded by an American herd of the Jersey breed, according to the American Jersey Cattle Club. It was the highest level of milk production attained by any Jersey herd in the nation, in 1944, and the second highest butterfat production the same year, regardless of milking frequencies. Incidentally, profit above feed costs for this herd was $389 per cow in 1944. The Bellefeuilles have long led their herd improvement association in low unit cost of milk production.

Although the concern of the district governing board with respect to strictly grassland farming was, and still remains, primarily for "problem farms," to its amazement farmers began to take matters into their own hands. Once the possibilities of grassland farming were fully realized, cooperators began shifting to an all-grass program so rapidly that it became difficult to keep district records up to date. The color of the soils map meant nothing to a cooperator who had made up his mind to dispense with corn silage. Approximately half of the cooperators are in grass at the present time.

Here again, coincidence no doubt has played an important part. For many farmers, the district hayland and pasture programs pointed a way out of the problems created by the wartime labor shortages. The experience of Clyde Estabrook of Randolph illustrates this well. In early March of 1943, Estabrook telephoned the district office to announce that he had lost his hired man, and that if he couldn't cut down on labor somehow he'd have to cut down on his milking herd. What did the district staff think about an all-grass program on his farm?

Estabrook didn't reduce the size of his herd. He didn't reduce the volume of much needed milk taken each morning to the milk plant. He didn't find another hired man. He didn't need one. He adopted grassland farming. Of course, 21 milkers and 15 young stock are a lot of animals for one man to take care of, but somehow Estabrook found time last year not only to take care of them well, but also to saw out 200 thousand shingles. He got out most of the logs for these also. This spring he even found time to paint his barns without assistance. Estabrook is just a shade over five feet tall, and slight of build at that.

Grassland farming adds up to maximum conservation farming and fits naturally into a family-sized dairy operation.

## CARTOGRAPHY AT WAR

(*Continued from page 78*)

scope and many features normally subordinated on maps and charts are of primary importance in radar navigation.

Prior to January 1945 the work performed for the Navy Department consisted of a number of small jobs; however, at this time a formal agreement was signed, making our reproduction facilities available to the Navy Hydrographic Office. Shortly after this agreement was signed the volume of work for the Navy increased to where our entire reproduction facilities were assigned to producing nautical and naval aeronautical charts. When hostilities ended there were a considerable number of nautical charts on the presses.

Another reasonably small project which continued throughout most of the war period was the compilation of aerial photo-maps. Photo-maps were prepared of a great many military areas throughout the United States and some foreign areas. The largest photo-map project covered approximately 25,000 square miles and was used in the Link trainer program.

In complying with the requests of the War and Navy Departments, it frequently has been necessary to discontinue all except the most pressing cartographic work for the Soil Conservation Service. Those responsible for establishing Service policies agreed that the type of work being performed for the War and Navy Departments should be given first priority.

Throughout the war period some operations were on a two-shift basis and for a considerable period three shifts were required. For several months while one project was in operation two 11-hour shifts per day on the basis of 13 days "on" and one day "off" were required. Information is not available regarding the total number of hours overtime worked (in excess of 48 hours per week) but I am sure this figure is quite large. Since September 1941 the work performed for war agencies amounted to about $2,000,000.

**Where are we going in agriculture? What is being planned for land-hungry veterans? These and many other urgent questions will be discussed in coming issues of SOIL CONSERVATION Magazine. Subscriptions may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C.; $1 per year, domestic.**

# Hope Quickens in Eden Valley—Water Program Moves Ahead

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## By A. E. McClymonds

*TRANSFER* of the Water Conservation and Utilization Program from the Farm Security Administration to the Soil Conservation Service became effective in July. Immediately involved were 1325 families and 120,000 acres of irrigated land in 17 Western States. In announcing the shift of responsibility John A. Goe, Area Director, explained: "Popularly known as the Wheeler-Case program, it has for its purpose the development of irrigation projects in the Western States through joint operation of the Department of Agriculture and the Interior. The Act of 1939 authorizes the Department of Agriculture to develop lands for production under irrigation, acquire and divide lands into farms of suitable size, select families for occupancy, and sell developed farms to qualified operators. Such developments follow construction of large dams and other facilities by the Department of the Interior which make possible the utilization of water on land by farm families."

One of the projects referred to in this transfer is in the sagebrush country of Western Wyoming, called Eden Valley. It is located along the highway to Yellowstone Park, 40 miles north of Rock Springs, Wyo. This project has had a rather dramatic past. It had its beginning in 1906, when a private irrigation company constructed the first

NOTE.—The author is regional conservator, Soil Conservation Service, Lincoln, Neb.

One of the older homes which has been improved because of faith borne of dependable water.

Main canal loaded to very last inch of capacity prior to being cleaned out.

One of the new homes built on project as result of confidence of people in Wheeler-Case program.

Most of the farms are mechanized.

Guard rails installed as safety precaution at a turnout.

diversion dam on Big Sandy River, and built the canals for delivering water to lands which had been patented to the State under the authority of the Carey Act. The first settlers arrived in 1910. Due to the slowness with which the area was settled and water rights contracted for, the original company and two succeeding companies experienced serious financial difficulties during the 30 years of project operations.

In 1941 the federal government acquired the interest of the last of these companies and initiated development of an expanded project under authority of an item in the 1940 Interior Appropriation Act. Plans included construction by the Bureau of Reclamation of a storage reservoir on Big Sandy River which would insure late season water for lands being farmed under irrigation and provide water for an additional 10,000 acres. The Department of Agriculture was to take care of the preparation of the project for the efficient use of irrigation water and the sub-division and sale of the new lands to qualified farm operators. Some of the reservoirs are located at an elevation of 11,000 feet. When construction was halted by the War Production Board the Department operated the system and utilized its maintenance equipment for repair of the existing distribution system and development of privately owned lands for more effective use of water. Heavy construction work has been at more or less of a standstill since 1942. In interim the local project manager relied on inadequate "baling-wire" methods to effect many repairs and to restore the irrigation system to a point where it would function well.

One of the first jobs undertaken before the shutdown was the dredging of the first mile and a half of intake canal. This canal carried the water from the Big Sandy River to an off-channel reservoir. Twelve-thousand cubic yards of sand and silt were removed. The concrete drops on the intake canal were repaired. Both the inlet and outlet portals of the tunnel through which the waters of the reservoir are released were in dangerous condition but have now been repaired.

The main distribution canal has now been dredged and 22,000 cubic yards of silt have been removed. Thirty percent more water can be carried safely. To get water to many of the higher points and on certain pieces of land, loading the canal beyond the safety point had been a common practice. Through the installation of a siphon and side laterals, this situation has been corrected and now the canal is loaded within accepted safety capacity.

The main canal banks, where passing through certain open areas because of high winds during the irrigation season, were severely damaged in many places by wave action. These banks have been protected with riprapping and other erosion resistent materials. The headgates and diversion gates, none of which was equipped with safety walks or guard rails, have had all such installations completed.

Much land leveling has been done, altogether about 2,000 acres on 40 different farms. Many soil surveys have been made, crop rotations have been worked out, pastures and hay meadows have been established. Dairy barns, livestock sheds, and homes show material improvement in appearance. Improvements in the Valley are a result of the faith that farmers and ranchers have in the prospects lighted up by Wheeler-Case program in their community.

"The leveling done on parts of my farm will make it possible for me to plant and irrigate some 10 to 12 acres of land which, previously, I have been unable to use," comments Robert W. Greig.

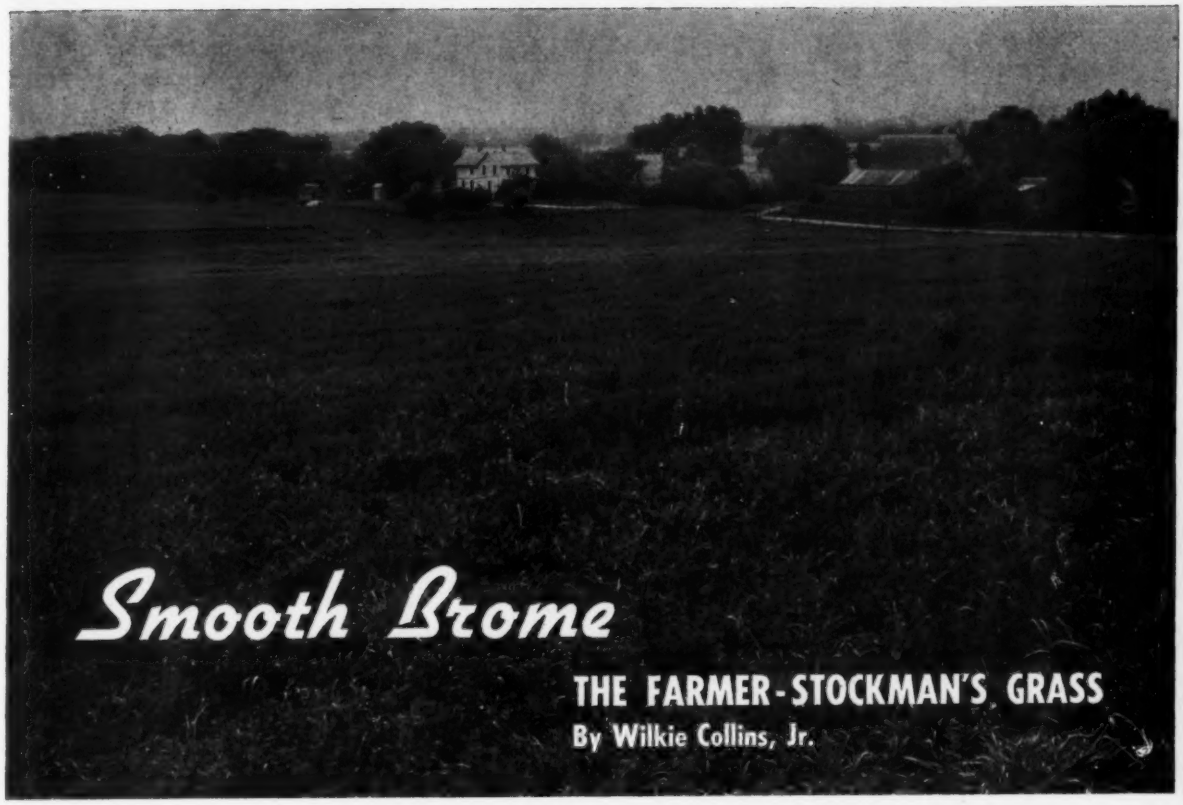
"One old, abandoned canal was filled in, and 17 acres of crop land, which was full of little gullies, was smoothed out and should produce double the crop hereafter," says Clarence N. Mershon.

Practically all farming operations in the Valley are mechanized. Tractors, haying equipment, and other mechanical tools are the rule. Farmers are interested chiefly in livestock and hay. Some root crops are raised, and increased production results on practically all fields on which new systems have been established. In fact, 100 bushels of oats to the acre was not uncommon in 1944 as contrasted to the former maximum of 25 to 40 bushels.

Among the many problems on this project were the uncertainty of water delivery, the improper preparation of fields for irrigation, the severe erosion in some of the supply ditches, the season-after-season silting in other ditches, the badly constructed or installed drops and turnout boxes, the poor drainage and the salting of many areas. Severe erosion, induced by inadequate provisions for water disposal, was apparent throughout the area.

Today the picture is quite different. Most of the supply ditches have been cleaned out. Many of the distribution systems have been improved through the establishment of drops that are technically good, and economically constructed and installed. Erosion and silt in the distribution system is practically at a standstill. Much land has been leveled. Good distribution has been effected. Some drainage has already been established. Flushing

*(Continued on page 91)*



# Smooth Brome

## THE FARMER-STOCKMAN'S GRASS

By Wilkie Collins, Jr.

SMOOTH brome is truly a farmer-stockman's grass. As a panacea for a great number of agricultural headaches, it's fast putting the proverbial county-fair patent medicine barker to shame. You see, smooth brome does do the job.

The ever-increasing popularity of this grass is giving it an important place in meeting the Nation's annual 160 million pound seed requirement. According to F. D. Keim, chairman of the Department of Agronomy at the Nebraska College of Agriculture there will be a million acres of Smooth brome in Nebraska by 1950.

The phenomenal increase of smooth brome acreage is due to the value of the grass as livestock feed, for conservation purposes, and for seed. Its large quantity of tough fibrous roots make it an excellent sod binder which can stand considerable abuse as well as silting and flooding.

According to R. L. Throckmorton, head of the Agronomy Department, Kansas State College, smooth brome in its region of adoptation and when mixed with alfalfa or clover, has no equal for hay or pasture. It is rapidly assuming the place long held by bluegrass.

NOTE.—The author is chief, regional agronomy division, Soil Conservation Service, Lincoln, Neb.

**Terraces empty onto this brome-alfalfa pasture, seeded in 1939, Marshall County, Kan.**

It is being used as a soil-conserving plant in rotations, for planting on steep cultivated slopes and in field draws, for buffer strips, for sod flumes and terrace outlets, for headlands around the fields, for roadside plantings, and . . . well, whatever the agricultural headache, give agriculturalists time and they'll come up with smooth brome as the answer, and be justified in doing so.

As a cash crop from Canada through the eastern parts of South Dakota, Nebraska, and Kansas on dry-farmed land, and farther west on irrigated land, smooth brome bows its head to no other grass. And, according to many farmers and stockmen, to no other crop. For increasing livestock production, for reducing winter feed needs, and for protectnig land from erosion it is unexcelled in the area mentioned. The cash return from the seed alone makes many a crop take a fifth-row gallery seat.

Once introduced in a community, the acreage of smooth brome can grow by leaps and bounds. In Pawnee County, Neb., none was being grown in 1935, according to D. E. Hutchinson, Nebraska Extension soil conservationist although it was in

this county that one of the first trial plantings was made back in 1898. Now, more than 1,000 of the 1,300 farmers in the country are producing this hardy, long-lived perennial which provides excellent spring, early summer, and late fall pasture, as well as a high quality hay which, if harvested at the proper time, is nearly equal in protein content to alfalfa. And in Gage County alone there were over 31,000 acres of smooth brome in 1944.

Typical of the many experiences farmers have had with this grass is the one related by the Reverend Peter C. Krey. Cooperating with the Cass County, Neb., Soil Conservation District, Krey had 180 acres of smooth brome in various combinations with alfalfa, sweet clover, and red clover. In 1943 he grazed 100 steers on this grass. In 1944, he harvested 42,000 pounds of seed, and from August on pastured 135 head of cattle on the acreage and had feed to spare. The income that year from the 237-acre farm on which no grain was grown was $6,500.

One of the oldest stands of smooth brome in the Northern Great Plains is on the J. B. Ryan farm, Holt County, Neb. The first planting was made on this unit in about 1900—20 years after its introduction into the United States. Seeded by Michael Holland, owner of the unit at that time, the original plot has furnished seed for all subsequent plantings. In the spring of 1944, Ryan harvested 32,000 pounds of seed from 150 acres.

From waterways and turn-rows alone, Vernon Cates, near Lyons, Neb., a cooperator with the Burt County Soil Conservation District, harvested 1,500 pounds of seed. Smooth brome seeded 5 years ago on bindweed-infested land on which sweet clover volunteered provided excellent pasture and held the bindweed under control, is the report of James Wardell, near Arlington. Herman Dinklage, Wisner, a cooperator with the Wayne County Soil Conservation District, has 140 acres of smooth brome and alfalfa and says that an acre will produce more beef than will an acre of corn.

David McCreath, Douglas County, Kan., state champion grass grower in Kansas for 1944, won his award on the returns he obtained from 16 acres of this grass. Seeding 20 pounds of seed per acre in September, he harvested 6,200 pounds of seed the following July and took off 920 bales of hay averaging 60½ pounds per bale. Later that same year when the second growth came on, he sold the young, green grass to a local dehydrater for $4 per ton. The grass returned $108 an acre.

George Whitcomb, Chase County, Kan., said that of all grasses, both native and tame which are adapted to his farm, smooth brome is his favorite.

"Smooth Brome," he said, "will carry more livestock through a longer grazing season than any other grass and undoubtedly is more palatable to all classes of livestock."

As this grass in many cases becomes sod-bound after a few years' growth, farmers are seeding it in mixture with alfalfa. Joe Caplin, Holt county, Neb., one of the outstanding pioneer bromegrass raisers in the Northern Great Plains, said that smooth brome and alfalfa were ideal companion crops and seem to do better when seeded together than when seeded alone.

"Bromegrass tends to become sod-bound quicker when sown alone," he said. "This means it has used up available nitrogen in the soil. Mixing it with alfalfa takes care of this problem.

"Thousands of head of more cattle could be carried in Holt county, if the adapted land were in smooth brome. It and alfalfa have been more profitable to me than corn, and on top of that, I don't have to worry about soil erosion or getting my corn planted during wet springs. And when the ground is broken up and rotated, the crops produce much more."

Smooth brome and alfalfa served a definite purpose to C. B. Mehrens, Washington County, Neb., a cooperator with the Papio Soil Conservation District.

"I had a hillside which had been plowed for crops," Mehrens said. "The place was a source of trouble because silt washed down from the hill onto the farmyard. Since establishing the mixture, there has been no run-off water or washing of silt from the hill, and now I get a good production of hay and pasture on the hillside."

An outstanding proponent of smooth brome-alfalfa mixture is F. D. Allington, a supervisor of the Gage County, Neb., Soil Conservation District, who operates a 680-acre unit.

Allington said recently, "Smooth brome and alfalfa produce the largest amount of excellent quality hay of any of the hay crops. Brome-alfalfa mixture will make good pasture at least 8 months out of the year and furnish some green feed for pigs and calves any time it is not covered by snow. At times, I've been able to pasture hogs the full year.

"Old timers say the sod, when turned over, looks like virgin soil. When it rains, the pasture drinks in the water instead of letting it run off and erode the soil.

D. E. Hutchinson, Nebraska extension soil conservationist, takes a look at some smooth brome seed, Pawnee County

**Breeding herd grazing in 500-acre smooth brome pasture, Pawnee County, Neb.**

"I received $13,000 from my hogs in 1944 and spent only $5,000 for feed. You can figure what the value of my 110-acre brome-alfalfa pasture is from that. The seed and hay brought an additional $4,400.

"My average cash returns from brome seed, pasture, and hay since 1938 have nearly doubled what I might have expected from a similar acreage planted in wheat."

Throughout adapted areas in Kansas, Montana, Nebraska, North Dakota, South Dakota and Wyoming, the Soil Conservation Service, is using smooth brome, or brome and alfalfa, extensively in conservation of soil and water resources. At the same time, however, farmers are being cautioned about two things: adaptability of the strain; and the use of a leguminous crop to furnish nitrogen to the soil so that the grass will maintain its productivity.

Tests made by farmers in cooperation with Soil Conservation Service technicians, and results at state experiment stations, indicate that there is a considerable difference in the way the southern and northern strains of smooth brome perform in Nebraska and Kansas. When the northern or Canadian strain is grown not as much forage is produced, it is more difficult to establish a good stand, and yields of seed are coniderably less. Since it is impossible to distinguish between the two strains by examining the seed, the demand for certified southern-strain seed is rapidly increasing. In Kansas, the Auchenbach smooth brome is being certified as a southern strain. And in 1944 approximately 61,250 pounds of the seed harvested were certified. In Nebraska the southern strain is certified as Lincoln type smooth brome, and last year 239,862 pounds of certified seed were harvested.

**Holstein dairy cows and calves grazing on furrowed pasture of brome and alfalfa, Washington County, Neb.**

One of the leading producers of the Lincoln type seed is N. F. Schroeder, near Hoskins, Neb. In 1944, Schroeder produced 100,000 pounds. The certified seed sold for 30 cents per pound. In addition, he makes full use of the grass for grazing and hay. His original brome field was seeded in 1898 by his grandfather who obtained the seed from Nebraska University. After more than 40

years of continuous production, the original field is still outstanding. Three years ago, the yield of seed from this field was 823 pounds per acre.

According to Mr. Throckmorton, smooth brome needs nitrogen to yield appreciable amounts of seed. By adding nitrogen fertilizer and when there is ample moisture, smooth brome seed yields have increased considerably, and have more than doubled. He cites the effects of the application of ammonium sulphate in increasing yields.

The Michigan Experiment Station produced 326 pounds of smooth brome seed to the acre through

Guernseys in a smooth brome pasture, southeast of Republican City, Neb.

the application of 400 pounds of ammonium sulphate. Only 90 pounds of seed was harvested when no nitrogen was introduced. The University of Nebraska results show that superphosphate has no beneficial effect on seed yields when applied to smooth brome. However, application of ammonium sulphate, 100 to 300 pounds per acre, increased yields.

Soil Conservation Service technicians have been careful, when assisting soil conservation district cooperators, to explain the value of introducing a leguminous crop with smooth brome to prevent sod-binding and low production. Some farmers are remedying this condition by spreading barnyard manure, and more recently by applying ammonium nitrate.

Recent tests by the Soil Conservation Service at Manhattan show that early spring application of nitrogen fertilizer is a very simple method of increasing seed yields. On one farm in eastern Nebraska the owner applied uramon, a fertilizer of high nitrogen content, on part of his field. On the area fertilized he harvested 500 pounds of seed to the acre. Where no fertilizer was used no seed was produced.

**One dollar will buy an acceptable Christmas gift for an up-and-coming farmer friend: a subscription to SOIL CONSERVATION Magazine.**

Ten different soil conservation districts in northeastern Nebraska and southeastern South Dakota are carrying on fertilizer demonstrations on lands seeded to smooth brome. Ammonium nitrate was applied at the rate of 200 pounds to the acre in late March and early April. The nitrate was applied by the solution method. The results will show the effects of the nitrate on the old stands of bromegrass.

Problems connected with seeding and growing smooth brome are few. The purpose of the demonstrations is to verify what has already been pretty well determined about the nitrogen needs of the crop.

To farmers throughout its area of adaptability, smooth brome is truly a farmer-stockman's grass. In the stretch of its race, it is truly passing virtually all other grasses qualified to run. It looks like a sure winner, a sure producer.

Smooth brome holds the soil, according to Joe Machalon, Saline County farmer—"even when picked up in sod form."

# SOIL FERTILITY AND TRACE ELEMENTS

By W. A. ROACH

When Britain was faced with a shortage of shipping, she met in consequence not only a reduction of imported food but also of the mineral fertilizers so urgently needed to increase food production. The urgent need for increased food crops led to the utilization of land that in peacetime had been considered unfit for cultivation. Many special problems in plant nutrition therefore arose and a concerted attack was launched by the Agricultural Research Council acting in association with the Agricultural Improvement Council for England and Wales. Special attention was given to the detection and cure of mineral deficiences and excesses in plants.

The importance of the major nutrients (nitrogen, phosphorus, potash and lime) had been fully realized following the work of Lawes and Gilbert a century ago; and a huge mineral fertilizer industry has grown up to supply the crops' requirements of these major nutrients. Magnesium has been known to be a constituent of chlorophyll, the all-important green coloring matter of plants, for a long time, and serious attention has been paid to the possibility of shortages of this element. The degree of importance of the trace elements, however, has not been realized until quite recently.

*Diagnosis of Mineral Deficiencies.* Professor Wallace, the director of Britain's Long Ashton Research Station, laid the foundation for the diagnosis of mineral deficiencies by the study of symptoms over twenty years ago. He grew plants in conditions which provided all necessary nutrients with some one major exception and studied the leaf symptoms resulting. These symptoms he used for diagnosing mineral deficiencies in the field. This symptom-description work has been taken up all over the world and applied to many agricultural plants, especially in America.

When symptoms are distinct and easily recognizable there is little need for other methods than this, but for many obscure cases other methods must be used. For this purpose, I started work on plant analysis and injection, mainly for fruit, over fifteen years ago; it was extended to primary food crops early in the world war.

Analysis reveals what is absorbed from the soil, and deficiencies may often be diagnosed on the basis of analysis alone, but this is by no means always possible. Because of the number of elements and of the minute amount of the trace elements, special chemical methods must be employed.

The widely used spectroscopic method is based on the fact that when a chemical element is heated to a very high temperature, it emits light of a characteristic color. In the spectograph such colors are separated and photographed as lines. The elements may be identified by the position of the lines, and their amounts may be determined from the densities of the lines.

Because of the difficulty of obtaining samples quite free from surface contamination by dust, spray or rain splashes I devised a method in which samples of only 0.025 g. of dry leaf material are needed. These are burnt in an oxyacetylene flame.

*Plant Injection.* The minimum requirement of each plant type for each nutrient must first be determined on healthy material and whenever a sample contains less than this amount a deficiency can be diagnosed on the basis of analysis alone. Trace elements, especially iron, frequently occur in the plant in a form which it cannot use; and, paradoxically, plants containing abnormally large amounts of iron frequently respond to the addition of more in a suitable form. This commonly happens in the presence of abnormally large amounts of calcium, the condition consequently being known as lime-induced chlorosis; and an excess of this element may be taken as an indication that one or more trace elements may be in an unsuitable form. For a definite diagnosis another method, e.g., plant injection, must be used.

Diagnostic injection consists in introducing solutions of the nutrients or mixtures each into a selected part of a plant and watching the effect by comparison with similar untreated parts of the plant. It is based on a number of fortunate facts: first, when a plant is cut, far from bleeding like an animal, it usually absorbs any watery liquid bathing the cut. If in the liquid colored dye is dissolved, its path in the plant may be traced visually. Instead of being pumped round the whole organism as in an animal, it travels limited distances along definite conducting tissues and is distributed thence into the leaf blade.

The mode and extent of travel depends on the size and position of the cut and varies from one plant species to another. A score or so of plants have so far been studied and for most of these it is possible to treat, or inject, at will, almost any part of the plant, from a tiny area between two neigh-

NOTE.—The author is with the East Malling Research Station, Kent, England.

boring veins of a leaf to a whole branch or even a whole tree. Most fortunately for the present purpose, substances introduced in this artificial manner produce similar effects to those resulting from ordinary absorption.

In the most commonly used method nutrients are introduced one or more at a time into one half of a leaf and the effect is seen, sometimes in two or three days, but more usually in a week or two, by comparison with the untreated half. The effect is revealed as either an improvement in color or "complexion", or increase in area or thickness and sometimes in all three respects.

*Spraying Solutions.* A further simple and quick method of diagnosis of trace elements and deficiencies which can be applied by technical officers and farmers and which works especially well for manganese and boron deficiencies, consists in spraying solutions containing the deficient minerals such as manganese sulphate and boric acid on the foliage of fairly young plants. An ordinary watering can fitted with a nozzle, may be used for field crops.

In practice 1 ounce of the mineral compound is dissolved in 5 gallons of water and sprayed over an area of 30 square yards.

Advisory officers and practical men have been quick to take advantage of all these methods.

*Increased Potato Tonnage.* The total failure of the potato crop over wide areas of ploughed up derelict lands in the west of England were proved by injection and analysis to be due to deficiencies of calcium and, to a less extent, magnesium. A waste product was used to make good the deficiency, and as a result there was an increase of some 3,000 tons of potatoes in 1943.

The same two methods revealed that the cause of a most devastating trouble in cherries, which had puzzled experts for 30 years, was a deficiency of manganese. This has been made good by introducing small pellets of manganese sulphate into holes drilled in the trunk; and trees that have been barren for years have produced a few months later heavy crops. This rapidity of action of injected substances enables cures to be effected in trees while more slow acting remedial treatments are supplied to the soil.

These are instances of the kind of work that is being done to help in the great task of feeding the large population of Britain's small islands and which we hope will contribute to the prosperity of all countries in the days of peace.

## HOPE QUICKENS IN EDEN VALLEY

(*Continued from page* 84)

of many of the salty lands has been done. Delivery of water on time, and its equitable distribution, is assured.

The noxious weed situation was rather severe. It has been improved already, however, through the cleaning up of ditch banks, and the adoption of better farming and irrigation practices.

Eden Valley, as mentioned in the beginning, has a dramatic background. Brigham Young and his Mormon followers stopped in the Valley on their trek across the plains and mountains en route to Great Salt Lake and Utah.

Here, where the annual rainfall is less than 7 inches, the valley's rejuvenation will have a direct influence on the stability of the livestock industry. Better utilization can be made of the range when it is supported by an assurance of winter feed. A brighter future hangs on the rancher's hopes for a dependable water supply.

# New Zealand and Erosion

An interesting sidelight on the spread of soil conservation is presented by copies of New Zealand Conservation Regulations and basic conservation law recently received in Washington. Regulations concerning the treatment and use of land were adopted in 1945 for soil conservation districts in New Zealand.

The regulations provide that no person in any soil conservation district shall set fire to any tree, shrub, grass or other plant growing on the land, or severed therefrom except in a fireplace or on land around a dwellinghouse. Likewise, no person shall destroy or damage any tree, grass, or shrub, except on land adjacent to a dwellinghouse, whether on the surface of the land or in or on the banks of a watercourse.

To avoid or reduce soil erosion the committee (for the soil conservation district) after written notice, also may require a land occupier—

(a) to change or restrict numbers, kind and class of livestock carried on the land,

(b) to refrain for a specified period from stocking, ploughing, or cultivating any or all of his land,

(c) to plant trees, grasses, shrubs or other plants where and by the time specified.

(d) to carry out specified works or to do other prescribed things to reduce or prevent soil erosion and damage by flood,

(e) not to change the present use of certain land or do anything that the committee thinks would promote soil erosion or promote damage by flood.

The committee is authorized to issue permits for burning in safe places where it will not cause soil erosion, and there are provisions for appeal and for changing regulations from time to time.

In New Zealand, soil conservation districts are established by declaration of the New Zealand Governor-General by "Order in Council" under the New Zealand "Soil Conservation and Rivers Control Act, 1941." The Soil Conservation and Rivers Control Council consists of six members besides the Governor-General—two officials of the country serving ex-officio and four appointed by the Governor-General. One of those appointed must be an officer of the Public Works Department; two must be recommended by the Minister as representing local authorities and boards, and one recommended by the Minister as representing agricultural and pastoral interests.

Each soil conservation district is run by a committee consisting of a "soil conservator" appointed directly by the council, one or more persons appointed by the council from nominations by local authorities and boards, and other persons appointed by the council because of specific knowledge of district problems but not greater in number than the appointments from nominations made by local authorities and boards.

—T. L. Gaston.

## These, Too, Fight for Soil

In August *Soil Conservation* listed war veterans employed in the Washington office of the Soil Conservation Service. Nearby Beltsville, Md.—usually associated with National headquarters—also has an impressive contingent who once served in the armed forces:

*Division of Cartography*

| *World War I* | *World War II* |
|---|---|
| Ancell, Vincent C., Jr. | Davies, Robert C. |
| Britsch, George | Holt, James A., Jr. |
| Byrnes, Thomas E. | Merritt, Eugene |
| Carey, James M. | Rogers, Willie |
| Duffield, Gary | Scherer, Andrew F. |
| German, George B. | |
| Kelsh, Harry T. | |
| Snyder, Joseph M. | |
| Walsh, Clarence R. | |

*Hillculture* (World War I)
Houghton, L. S.
O'Rourke, Frances L.

*Nursery* (World War I)
Hall, Ira D.

## REVIEWS

*All over the land interest is quickening in the vital relationship of soil to nutrition. More and more concern is evidenced by the medical profession in many hitherto neglected details of the national diet. Much is surmised but far too little is known through actual experimentation. Grocery-store foods too often have provided the materials for laboratory research, with little or no question raised as to the sources of such materials—those soil sources which, it is now generally conceded, vary widely in nutritional content. "Must We Starve?"—reviewed below—is another stinging reminder to get busy, lest we all eat ourselves to death.*—The Editor.

**MUST WE STARVE? By Joseph James. F. Muller, Ltd., London. 1944.**

This little book forcefully points out the pressing need for adequate research on soil depletion in relation to the health of plants, animals and humans. The author tells us that "every particle of fertile earth is a little world in miniature, pulsating with life." If the soil were not alive, human life itself would be impossible. He finds the concept of living soil so revolutionary "that it is not too much to say that its arrival means the opening of new avenues of advance for mankind." To understand the soil, James holds that we must study the effect of animals and plants upon it. "Given a right relationship between them and we get a fertile soil; upset that relationship and we get a desert."

Improper feeding of the soil causes it to become sick and a sick soil affects the health of plants and animals. "Consequently, we who feed on both plants and animals will suffer also." The author presents many observations showing that disease in our crops, in our fruit trees and amongst our domestic animals has greatly increased in recent years, concurrently with a profound change in farming methods. He believes it is impossible that there is no connection between health of plants and animals, and health of soil. "The trouble seems to be here: that having made our discoveries in the chemist's laboratory, we then apply to the soil compounds prepared by the chemist and that, in ways not yet understood, plant life is unable to assimilate its food in this form, and therefore starves." Opposed to this is evidence that soil fertility gained from natural manuring produced healthy soil, healthy plants and animals, and benefits human health.

"Good health is the greatest boon enjoyed by man, and if our methods of farming are jeopardising this, then the case for a thorough-going examination and careful experiment is abundantly made out. Without question, food is going to be a major problem for some years to come. It surely needs no emphasis that any attempts at this time of day to suppress, or even to modify, the now settled demands for a higher standard of living, are bound to have social and political consequences that every well-disposed person will do his utmost to avoid. That is one factor. Another is, that taking the world over, the output per unit under cultivation is falling. With both factors operative concurrently—as they are—it is obvious that we face a problem of unparalled importance. Nevertheless, whilst disaster is only too possible, it is not inevitable. There is a way out, but it means an almost complete reversal of our way of thinking. We live in an age of science. Science, certainly, has invaded the fields. Enormous crops have resulted, but also new ills have appeared. That there may be a link between the new methods and the new ills seems not generally to have been remarked. Obviously, the matter cannot be decided by prejudice or by argument; it can only be decided by experiment. To do this it is essential that there should be undertaken a large-scale demonstration; large-scale both in area and time. Land of different qualities should be farmed—one section by natural methods, and one section—as nearly as possible comparable with the first—by scientific methods. The crops should be kept separate. Animals should be fed from these crops, and the results noted. Those fed from naturally grown foods should be kept exclusively on it, and likewise with the others. The experiment should be for a period of years. It should be undertaken by the Government. And that is where we come in. Government action in any matter depends upon public opinion. If the voice of the people were clamant in this matter no Government would resist." —S.B.Detwiler.

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**HOW SOD AFFECTS ESTABLISHMENT OF HYBRID POPLAR PLANTATIONS. By Ernest J. Schreiner. Journal of Forestry. June 1945.**

Here is a long treatise well worth study by anyone responsible for planting on old fields. For tree planting, these are deteriorated sites, not generally suitable for planting hardwoods. Even pines do better with some site preparation. Nature's method of reestablishing hardwoods is very slow and painstakingly deliberate. She first builds a forest soil by growing pioneer species such as sassafras, persimmon, buckbrush pines, etc.

The conservationist's and forester's problem is to adopt measures that in a few years will accomplish what nature does over a generation or two. One possible way of advancing the ecological process was reported by Sir Roy Robinson in *The Journal of the Society of Foresters of Great Britain* and reviewed in *Soil Conservation* March 1945. His method was to plant hardwoods with conifers as nurse crops so that the hardwoods could take hold as soon as the pines sufficiently changed the soil conditions to favor hardwood growth. The experiences of McIntyre at State College, Pennsylvania, seem to support Robinson's conclusion.

Now Schreiner has learned something about planting poplar on old fields which may be an alternative method of establishing other hardwoods. Briefly he reports success following two practices (1) turning the grass sod into the soil in which the trees are planted (the old method of turning the sod and planting in the furrow does not do this). He thinks that the incorporation of the sod into the soil adds enough organic matter "to tip the balance in favor of tree growth." (2) weeding the plantation during the first growing season. He advocates weeding for 2 or more years. However, with site preparation equivalent to plowing and with incorporation of sod into the soil, trees weeded only during the first year averaged 15 feet in height at the end of 4 years in contrast to 6.7 feet for trees not weeded.

—John F. Preston.

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**IF THE PROSPECT PLEASES. The West The Guidebooks Never Mention. By Ladd Haystead. University of Oklahoma Press. 1945.**

Ladd Haystead, farm editor of *Fortune Magazine,* has made a contribution—like the war—to the unification of the American people. In his book he raises the question, just where does the West begin or just where is any line that sets any one group of us off against another? When he points out that the West is an area, a climate, a certain soil and certain vocations suited thereto, and not a form of society, he is telling us that different regions give differences in people. But these differences need not separate them as humans, or as citizens of a country and supporters of its causes. He is subtly calling upon us to crystallize out just what our American national philosophy is to be in the face of these differences among people in our own country, now about to become one among many countries of the world.

With history, empire has seemingly always been taking its way westward. But as Haystead

# DEATH OF A GREAT ECOLOGIST

On July 26 Dr. Frederic E. Clements, internationally renowned ecologist, died in a Santa Barbara hospital of undulant fever. With his passing the Soil Conservation Service lost one of its most inspiring and loyal supporters and collaborators.

Dr. Clements was born, reared and educated in Lincoln, Neb. He first taught at the University of Nebraska, and later at the University of Minnesota. At the Carnegie Institute of Washington, D. C., he conducted a wide field of ecological investigations which lasted over a quarter of a century.

Dr. Clements has probably done more than any other man to make ecology a coherent science for agricultural workers. He consolidated the usable fragments of early ecology developed by his predecessors, added his own ingenious elaborations, and then wrote the language to describe the science.

In 1935 he became an official collaborator of the Soil Conservation Service, a position which he held until his retirement from Carnegie, nearly three years ago. Since then he has given his time freely and without charge to the Soil Conservation Service regions west of the Mississippi River. Last spring he was commissioned to give special training to Service personnel in ecology.

Dr. Clements had a rare gift for teaching those with whom he came in contact during his extensive travels over the nation. He pursued the Socratic method of teaching, using many Clementisian innovations with which he inspired students to carry on original studies of their own. Fortunately, several hundred of his outdoor students, who benefited from his teaching, are members of the Soil Conservation Service. He was a vigorous proponent of outdoor teaching, and he leavened his own experiences with those of others. His viewpoint was expansive and dynamic.

Constant companion at his laboratories at Santa Barbara, Cal., and Manitou, Col., and on his numerous cross-country explorations, was his wife, Dr. Edith S. Clements, artist and ecologist in her own right. Together, they formed one of the most illustrious husband-wife teams since the Curies of France.

The Clementisian thesis is based upon an equilateral triangle of land, water and biology which depends for its success upon the harmonious operation of all three. Fortunately, he wrote extensively and gave generously to all who sought his advice and teachings, with the result that he has left a permanent endowment to the science of ecology.

—B. W. Allred.

points out, this movement has been according to the resources which lead it here. The prospects of the West in some cases were over-rated, in other under-rated. As a consequence, ghost towns, booms, gushers, and various extremes of human experience have made up the record. This story suggests that the soil as made by the climate, more than the politics, is marking out the geographical limits of territories. Our South, and North, or our East and West, as they represent a particular struggle for food and shelter with generous or niggardly provisions, have given us attitudes that mark us out as different persons. We are a product of the particular area. Declining resources bring on the attitude of caution, while glittering prospects give the Westerner breeziness and make him a fellow "hail and well-met." "The Western proletariat haven't yet discovered they are proletariat, have little sense of caste, and probably know by their first names at least one or two millionaires who yesterday were school-mates without shoes, or drove a tractor for a couple of dollars a day while they waited for oil wells, mines or some other fairy story to come true."

The book will be an encouragement to those prone to worry about postwar disintegration of the present national unity. It cleverly portrays our different attitudes for helpful understanding and tolerance of them. It speaks frankly as Haystead, a Westerner himself, can. It puts the West on the "fringe of the fairly tight and integrated balance of the Nation." But when distances are being annihilated and regional lines eliminated so readily now, "we cannot afford to have any division here at home."

This book by one in agriculture will be good reading to any one interested in the open country and all that the open country can now mean as the foundation of this country among all the countries of the world.

—W. A. Albrecht.

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## Compiled by William L. Robey, Printing & Distribution Unit

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The timber acre contributes its share to the farm business in dollars and cents. This 82-year-old farmer of Cairo, West Virginia, cut 33 units of pulpwood last year.

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*See your Soil Conservation Service representative or county agent and local wood buyer for information on what to cut, how to cut, and how to sell.*

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